

SEQUENCE LISTING

SEQ ID NO: 1: Nucleotide sequence of 11.5 kb PCR product amplified from chromosomal DNA of *C. jejuni* OH4384 which includes *LOS* biosynthesis locus

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1  aaagaatacgc aatttgctaa agagggtttta aatcttagtg gtattgatga aacacatata
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SEQ ID NO: 1 (cont'd)

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SEQ ID NO: 1 (cont'd)

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 4141 tcttatttta ccaaaaaaaa ctttgttgc aattaataaa tacaacaatg aagattttaat
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 7561 cagataaatct tgcgtgttta ggtgcggttg cacttggctg ttgtgtgctt gaaagacatt
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SEQ ID NO: 1 (cont'd)

11221 accatattta aactattatc ttacttttta tcatcgataa tcaaaatttc aatatctttt
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11341 gggattatga tagaaagtgt tggcataatt ttcctaaatt ttgttaaaat aataaaaaaca
11401 attctatcaa agtttaggaa atttatgaaa atttttatc accttccaac ctggttaggc
11461 gatacggtaa tggc

SEQ ID NO: 2: Nucleotide sequence that encodes bifunctional sialyltransferase *cstII* from *C. jejuni* strain OH4384 (ORF 7a of *LOS* biosynthesis locus)

ATGAAAAAAG	TTATTATTGC	TGGAAATGGA	CCAAGTTTAA	AAGAAATTGA	50
TTATTCAAGA	CTACCAAATG	ATTTTGATGT	ATTTAGATGT	AATCAATTTT	100
ATTTTGAAGA	TAAATACTAT	CTTGGTAAAA	AATGCAAGGC	AGTATTTTAC	150
AATCCTATTC	TTTTTTTTGA	ACAATACTAC	ACTTTAAAAC	ATTTAATCCA	200
AAATCAAGAA	TATGAGACCG	AACTAATTAT	GTGTTCTAAT	TACAACCAAG	250
CTCATCTAGA	AAATGAAAAT	TTTGTAAGAA	CTTTTACGA	TTATTTTCCT	300
GATGCTCATT	TGGGATATGA	TTTTTTTCAA	CAACTTAAAG	ATTTTAATGC	350
TTATTTTAAA	TTTCACGAAA	TTTATTTCAA	TCAAAGAATT	ACCTCAGGGG	400
TTTATATGTG	TGCAGTAGCC	ATAGCCCTAG	GATACAAAGA	AATTTATCTT	450
TCGGGAATTG	ATTTTATCA	AAATGGGTCA	TCTTATGCTT	TTGATACTAA	500
ACAAAAAAT	CTTTTAAAAT	TGGCTCCTAA	TTTTAAAAAT	GATAATTCAC	550
ACTATATCGG	ACATAGTAAA	AATACAGATA	TAAAAGCTTT	AGAATTTCTA	600
GAAAAAACTT	ACAAAATAAA	ACTATATTGC	TTATGTCCTA	ACAGTCTTTT	650
AGCAAATTTT	ATAGAAGTAG	CGCCAAATTT	AAATTCAAAT	TTTATCATAC	700
AAGAAAAAAA	TAAGTACACT	AAAGATATAC	TCATACCTTC	TAGTGAGGCT	750
TATGGAAAAT	TTTCAAAAAA	TATTAATTTT	AAAAAAATAA	AAATTAAAGA	800
AAATATTTAT	TACAAGTTGA	TAAAAGATCT	ATTAAGATTA	CCTAGTGATA	850
TAAAGCATT	TTTCAAAGGA	AAATAA			876

SEQ ID NO: 3: Amino acid sequence of bifunctional sialyltransferase *CstII* from *C. jejuni* strain OH4384 (encoded by ORF 7a of *LOS* biosynthesis locus)

	10	20	30	40	50
1	MKKVIIAGNG	PSLKEIDYSR	LPNDFDVFR	C NQFYFEDKYY	LGKKCKAVFY
51	NPILFFEQYY	TLKHLIQNQE	YETELIMCSN	YNQAHLENEN	FVKTFYDYFP
101	DAHLGYDFEK	QLKDFNAYFK	FHEIYFNQRI	TSGVYMCABA	IALGYKEIYL
151	SGIDFYQNGS	SYAFDTKQKN	LLKLAPNFKN	DNSHYIGHSK	NTDIKALEFL
201	EKTYKIKLYC	LCPNSLLANF	IELAPNLNSN	FIIQEKNNYT	KDILIPSSEA
251	YGKFSKNINF	KKIKIKENIY	YKLIKDLLRL	PSDIKHYFKG	K

SEQ ID NO: 4: Nucleotide sequence of bifunctional sialyltransferase-encoding *cstII* (ORF7a) from *LOS* biosynthesis locus of *C. jejuni* serotype O:10

ATGAAAAAAG	TTATTATTGC	TGGAAATGGA	CCAAGTTTAA	AAGAAATTGA	50
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ATTTTGAAGA	TAAATACTAT	CTTGGTAAAA	AATTCAAAGC	AGTATTTTAC	150
AATCCTGGTC	TTTTTTTTGA	ACAATACTAC	ACTTTAAAAC	ATTTAATCCA	200
AAATCAAGAA	TATGAGACCG	AACTAATTAT	GTGTTCTAAT	TACAACCAAG	250
CTCATCTAGA	AAATGAAAAT	TTTGTAAGAA	CTTTTACGA	TTATTTTCCT	300
GATGCTCATT	TGGGATATGA	TTTTTTTAAA	CAACTTAAAG	AATTTAATGC	350
TTATTTTAAA	TTTCACGAAA	TTTATCTCAA	TCAAAGAATT	ACCTCAGGAG	400
TCTATATGTG	TGCAGTAGCT	ATAGCCCTAG	GATACAAAGA	AATTTATCTT	450
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GAAAAAACTT	ACAAAATAAA	ACTATATTGC	TTATGTCCTA	ACAGTCTTTT	650
AGCAAATTTT	ATAGAAGTAG	CGCCAAATTT	AAATTCAAAT	TTTATCATAC	700
AAGAAAAAAA	TAAGTACACT	AAAGATATAC	TCATACCTTC	TAGTGAGGCT	750

TATGGAAAAT	TTTCAAAAAA	TATTAATTTT	AAAAAAATAA	AAATTAAAGA	800
AAATATTTAT	TACAAGTTGA	TAAAAGATCT	ATTAAGATTA	CCTAGTGATA	850
TAAAGCATT	TTTCAAAGGA	AAATAA			876

SEQ ID NO: 5. Amino acid sequence of bifunctional sialyltransferase *cstII* encoded by ORF 7a of *LOS* biosynthesis locus from *C. jejuni* serotype O:10

	10	20	30	40	50
1	MKKVIIAGNG	PSLKEIDYSR	LPNDFDVFC	NQFYFEDKYY	LGKKFKAVFY
51	NPGLFFEQYY	TLKHLIQNQE	YETELIMCSN	YNQAHLENEN	FVKTFYDYFP
101	DAHLGYDFFK	QLKEFNAYFK	FHEIYLNQRI	TSGVYMCAVA	IALGYKEIYL
151	SGIDFYQNGS	SYAFDTKQEN	LLKLAPDFKN	DRSHYIGHSK	NTDIKALEFL
201	EKTYKIKLYC	LCPNSLLANF	IELAPNLNSN	FIIQEKNNYT	KDILIPSSEA
251	YGKFSKNINF	KKIKIKENIY	YKLIKDLLRL	PSDIKHYFKG	K

SEQ ID NO: 6. Nucleotide sequence of *C. jejuni* serotype O:41 *cstII* coding region

ATGAAAAAAG	TTATTATTGC	TGGAAATGGA	CCAAGTTTAA	AAGAAATTGA	50
TTATTCAAGA	CTACCAAATG	ATTTTGATGT	ATTTAGATGC	AATCAATTTT	100
ATTTTGAAGA	TAAATACTAT	CTTGGTAAAA	AATGCAAAGC	AGTATTTTAC	150
AATCCTAGTC	TTTTTTTTGA	ACAATACTAC	ACTTTAAAC	ATTTAATCCA	200
AAATCAAGAA	TATGAGACCG	AACTAATCAT	GTGTTCTAAT	TTTAACCAAG	250
CTCATCTAGA	AAATCAAAAT	TTTGTAAGAA	CTTTTACGA	TTATTTTCCT	300
GATGCTCATT	TGGGATATGA	TTTTTTTCAA	CAACTTAAAG	AATTCATGC	350
TTATTTTAAA	TTTCACGAAA	TTTATTTCAA	TCAAAGAATT	ACCTCAGGGG	400
TCTATATGTG	CACAGTAGCC	ATAGCCCTAG	GATACAAAGA	AATTTATCTT	450
TCGGGAATTG	ATTTTATCA	AAATGGATCA	TCTTATGCTT	TTGATACCAA	500
ACAAAAAAAT	CTTTTAAAT	TGGCTCCTAA	TTTTAAAAAT	GATAATTCAC	550
ACTATATCGG	ACATAGTAAA	AATACAGATA	TAAAAGCTTT	AGAATTTCTA	600
GAAAAAACTT	ACGAAATAAA	GCTATATTGT	TTATGTCCTA	ACAGTCTTTT	650
AGCAAATTTT	ATAGAACTAG	CGCCAAATTT	AAATTCAAAT	TTTATCATAC	700
AAGAAAAAAA	TAACTATACT	AAAGATATAC	TCATACCTTC	TAGTGAGGCT	750
TATGGAAAAT	TTACAAAAAA	TATTAATTTT	AAAAAAATAA	AAATTAAAGA	800
AAATATTTAT	TACAAGTTGA	TAAAAGATCT	ATTAAGATTA	CCTAGTGATA	850
TAAAGCATT	TTTCAAAGGA	AAATAA			876

SEQ ID NO: 7. Amino acid sequence of *CstII* from *C. jejuni* serotype O:41

	10	20	30	40	50
1	MKKVIIAGNG	PSLKEIDYSR	LPNDFDVFC	NQFYFEDKYY	LGKKCKAVFY
51	NPSLFFEQYY	TLKHLIQNQE	YETELIMCSN	FNQAHLENQN	FVKTFYDYFP
101	DAHLGYDFFK	QLKEFNAYFK	FHEIYFNQRI	TSGVYMCTVA	IALGYKEIYL
151	SGIDFYQNGS	SYAFDTKQKN	LLKLAPNFKN	DNSHYIGHSK	NTDIKALEFL
201	EKTYEIKLYC	LCPNSLLANF	IELAPNLNSN	FIIQEKNNYT	KDILIPSSEA
251	YGKFTKNINF	KKIKIKENIY	YKLIKDLLRL	PSDIKHYFKG	K

SEQ ID NO: 8. Nucleotide sequence of coding region for *CstII* from *C. jejuni* O:19.

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1  atgaaaaaag ttattattgc tggaaatgga ccaagtttaa aagaaattga
51  ttattcaagg ctaccaaatg attttgatgt atttagatgt aatcaatttt
101 attttgaaga taaatactat cttggtaaaa aatgcaaagc agtgttttac
151 acccctaatt tcttctttga gcaatactac actttaaaac atttaatcca
201 aaatcaagaa tatgagaccg aactaattat gtgttcta atacaaccaag
251 ctcactctaga aaatgaaaat tttgtaaaaa ctttttacga ttattttcct
301 gatgctcatt tgggatatga ttttttttaa caacttaaag aatttaatgc
351 ttatttttaa tttcacgaaa tttattttcaa tcaaagaatt acctcagggg
401 tctatatgtg tgcagtagcc atagccctag gatacaaaga aatttatcct
451 tcgggaattg atttttatca aaatgggtca tcttatgctt ttgatacca
501 acaagaaaat ctttttaaaac tagcccctga ttttaaaaat gatcgctcgc
551 actatatcgg acatagtaaa aatacagata taaaagcttt agaatttcta
601 gaaaaaactt acaaaaataaa actatatgtc ttatgtccta atagtctttt
651 agcaaatttt atagaactag cgccaaattt aaattcaaat tttatcatac
701 aagaaaaaaa taactacact aaagatatac tcataccttc tagtgaggct
751 tatggaaaat tttcaaaaaa tattaatttt aaaaaataa aaattaaaga
801 aaatgtttat tacaagttag taaaagatct attaagatta cctagtgata
851 taaagcatta tttcaaagga aaataa

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SEQ ID NO: 9. Amino acid sequence of *CstII* from *C. jejuni* O:19.

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1  MKKVIIAGNG PSLKEIDYSR LPNDFDVFR C NQFYFEDKYY LGKKCKAVFY
51  TPNFFFEQYY TLKHLIQNQE YETELIMCSN YNQAHLNEN FVKTFYDYFP
101 DAHLGYDFFK QLKEFNAYFK FHEIYFNQRI TSGVYMCABA IALGYKEIYL
151 SGIDFYQNGS SYAFDTKQEN LLKLAPDFKN DRSHYIGHSK NTDIKALEFL
201 EKTYKIKLYC LCPNSLLANF IELAPNLNSN FIIQEKNNYT KDILIPSSEA
251 YGKFSKNINF KKI KIKENVY YKLIKDLLRL PSDIKHYFKG K

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SEQ ID NO: 10. Amino acid sequence of *CstII* from *C. jejuni* strain NCTC 11168

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          10          20          30          40          50
1  MSMNINALVC GNGPSLKNID YKRLPKQFDV FRCNQFYFED RYFVGKDVKY
51 VFFNPFVFFE QYYTSKKLIQ NEEYNIENIV CSTINLEYID GFQFVDNFEL
101 YFSDAFLGHE IIKKLKDFFA YIKYNEIYNR QRITSGVYMC ATAVALGYKS
151 IYISGIDFYQ DTNNLYAFDN NKNLLNKCT GFKNQKFKFI NHSMACDLQA
201 LDYLMKRYDV NIYSLNSDEY FKLAPDIGSD FVLSKKPKKY INDILIPDKY
251 AQERYYGKKS RLKENLHYKL IKDLIRLPSD IKHYLKEKYA NKNR

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SEQ. ID NO: 11. Nucleotide sequence for coding region for *Cst II* from *C. jejuni* O:4

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1  ATGAAAAAAG TTATTATTGC TGGAAATGGA CCAAGTTTAA AAGAAATTGA TTATTCAAGG
61  CTACCAAATG ATTTTGATGT ATTTAGATGT AATCAATTTT ATTTTGAAGA TAAATACTAT
121 CTTGGTAAAA AATGCAAAGC AGTGTTTTAC ACCCCTGGTT TCTTCTTTGA GCAATACTAC
181 ACTTTAAAAC ATTTAATCCA AAATCAAGAA TATGAGACCG AACTAATTAT GTGTTCTAAT
241 TACAACCAAG CTCATCTAGA AAATGAAAAT TTTGTAAAAA CTTTTTACGA TTATTTTCCT
301 GATGCTCATT TGGGATATGA TTTTTTTAAA CAACTTAAAG AATTTAATGC TTATTTTAAA
361 TTTACAGAAA TTTATTTCAA TCAAAGAATT ACCTCAGGGG TCTATATGTG TGCAGTAGCC
421 ATAGCCCTAG GATACAAAGA AATTATCTT TCGGGAATTG ATTTTATCA AAATGGGTCA
481 TCTTATGCTT TTGATACCAA ACAAGAAAAT CTTTTTAAAC TAGCCCCTGA TTTTAAAAAT
541 GATCGCTCAC ACTATATCGG ACATAGTAAA AATACAGATA TAAAAGCTTT AGAATTTCTA

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601 GAAAAAACTT ACAAATAAA ACTATATTGC TTATGTCCTA ACAGTCTTTT AGCAAATTTT
661 ATAGAACTAG CGCCAAATTT AAATTCAAAT TTTATCATAC AAGAAAAAAA TAACTACACT
721 AAAGATATAC TCATACCTTC TAGTGAGGCT TATGGAAAAT TTTCAAAAAA TATTAATTTT
781 AAAAAAATAA AAATTAAAGA AAATGTTTAT TACAAGTTGA TAAAAGATCT ATTAAGATTA
841 CCTAGTGATA TAAAGCATTA TTTCAAAGGA AAA

SEQ ID NO: 12. Amino acid sequence of Cst II from *C. jejuni* 0:4

MKKVIIAGNG PSLKEIDYSR LPNDFDVFR C NQFYFEDKYY LGKKCKAVFY TPGFFFEQY
YTLKHLIQNQ EYETELIMCS NYNQAHLNE NFVKTFYDYF PDAHLGYDFF KQLKEFNAY
FKFHEIYFNQ RITSGVYMCA VAIALGYKEI YLSGIDFYQN GSSYAFDTKQ ENLLKLAPD
FKNDRSHYIG HSKNTDIKAL EFLEKTYKIK LYCLCPNSLL ANFIELAPNL NSNFIIQEK
NNYTKDILIP SSEAYGKFSK NINFKKIKIK ENVYKLIKD LLRLPSDIKH YFKGK

SEQ ID NO: 13. Nucleotide sequence for coding region for Cst II from *C. jejuni* 0:36

ATGAAAAAAG TTATTATTGC TGGAAATGGA CCAAGTTTAA AAGAAATTGA TTATTCAAGG
CTACCAAATG ATTTTGATGT ATTTAGATGT AATCAATTTT ATTTTGAAGA TAAATACTAT
CTTGGTAAAA AATGCAAAAC AGTGTTTTAC ACCCCTAATT TCTTCTTTGA GCAATACTAC
ACTTTAAAC ATTTAATCCA AAATCAAGAA TATGAGACCG AACTAATTAT GTGTTCTAAT
TACAACCAAG CTCATCTAGA AAATGAAAAA TTTGTAAAAA CTTTTTACGA TTATTTTCCT
GATGCTCATT TGGGATATGA TTTTTTAAAA CAACTTAAAG AATTTAATGC TTATTTTAAA
TTTCACGAAA TTTATTTCAA TCAAAGAATT ACCTCAGGGG TCTATATGTG TGCAGTAGCC
ATAGCCCTAG GATACAAAGA AATTTATCTT TCGGGAATTG ATTTTATCA AAATGGGTCA
TCTTATGCTT TTGATACCAA ACAAGAAAAA CTTTTAAAC TAGCCCCTGA TTTTAAAAAT
GATCGCTCAC ACTATATCGG ACATAGTAAA AATACAGATA TAAAAGCTTT AGAATTTCTA
GAAAAAACTT ACAAATAAA ACTATATTGC TTATGTCCTA ATAGTCTTTT AGCAAATTTT
ATAGAACTAG CGCCAAATTT AAATTCAAAT TTTATCATAC AAGAAAAAAA TAACTACACT
AAAGATATAC TCATACCTTC TAGTGAGGCT TATGGAAAAT TTTCAAAAAA TATTAATTTT
AAAAAATAA AAATTAAAGA AAATGTTTAT TACAAGTTGA TAAAAGATCT ATTAAGATTA
CCTAGTGATA TAAAGCATTA TTTCAAAGGA AAA

SEQ ID NO: 14. Amino acid sequence of Cst II from *C. jejuni* 0:36.

MKKVIIAGNG PSLKEIDYSR LPNDFDVFR C NQFYFEDKYY LGKKCKTVFY TPNFFFEQY
YTLKHLIQNQ EYETELIMCS NYNQAHLNE NFVKTFYDYF PDAHLGYDFF KQLKEFNAY
FKFHEIYFNQ RITSGVYMCA VAIALGYKEI YLSGIDFYQN GSSYAFDTKQ ENLLKLAPD
FKNDRSHYIG HSKNTDIKAL EFLEKTYKIK LYCLCPNSLL ANFIELAPNL NSNFIIQEK
NNYTKDILIP SSEAYGKFSK NINFKKIKIK ENVYKLIKD LLRLPSDIKH YFKGK

SEQ ID NO: 15: Nucleotide sequence of glycosyltransferase-encoding ORF 4a of *LOS* biosynthesis locus from *C. jejuni* strain OH4384

ATGAAGAAAA	TAGGTGTAGT	TATACCAATC	TATAATGTAG	AAAAATATTT	50
AAGAGAATGT	TTAGATAGCG	TTATCAATCA	AACTTATACT	AACTTAGAAA	100
TCATACTTGT	CAATGATGGT	AGCACAGATG	AACACTCACT	CAATATTGCA	150
AAAGAATATA	CCTTAAAGA	TAAAAGAATA	ACTCTTTTGT	ATAAGAAAAA	200
TGGGGGTTTA	AGTTCAGCTA	GAAATATAGG	TATAGAATAC	TTTAGCGGGG	250
AATATAAATT	AAAAACAAA	ACTCAACATA	TAAAAGAAAA	TTCTTTAATA	300
GAATTTCAAT	TGGATGGTAA	TAATCCTTAT	AATATATATA	AAGCATATAA	350
AAGCTCTCAA	GCTTTTAATA	ATGAAAAAGA	TTTAACCAAT	TTTACTTACC	400
CTAGTATAGA	TTATATTATA	TTCTTAGATA	GTGATAATTA	TTGGAACATA	450
AACTGCATAG	AAGAATGCGT	TATAAGAATG	AAAAATGTGG	ATGTATTGTG	500
GTTTGACCAT	GATTGCACCT	ATGAAGACAA	TATAAAAAAT	AAGCACAAAA	550
AAACAAGGAT	GGAAATTTTT	GATTTTAAAA	AAGAATGTAT	AATCACTCCA	600

AAAGAATATG	CAAATCGAGC	ATTAAGTGTG	GGATCTAGAG	ATATTTCTTT	650
TGGATGGAAT	GGAATGATTG	ATTTTAATTT	TTTAAAGCAA	ATTAAACTTA	700
AATTTATAAA	TTTTATTATC	AATGAAGATA	TACACTTTGG	GATAATTTTG	750
TTTGCTAGTG	CTAATAAAAT	TTATGTTTTA	TCACAAAAGT	TGTATTTGTG	800
TCGTTTAAGA	GCAAAACAGTA	TATCAAATCA	TGATAAGAAG	ATTACAAAAG	850
CAAATGTGTC	AGAGTATTTT	AAAGATATAT	ATGAAACTTT	CGGGGAAAAC	900
GCTAAGGAAG	CAAAAAATTA	TTTAAAAGCA	GCAAGCAGGG	TTATAACTGC	950
TTTAAAATTG	ATAGAATTTT	TTAAAGATCA	AAAAAACGAA	AATGCACTTG	1000
CTATAAAAGA	AACATTTTTA	CCTTGCTATG	CCAAAAAAGC	TTTAATGATT	1050
AAAAAATTTA	AAAAAGATCC	TTTAAATTTA	AAGGAACAAT	TAGTTTTAAT	1100
TAAACCTTTT	ATTCAAACAA	AACTTCCTTA	TGATATTTGG	AAATTTTGGC	1150
AAAAAATAAA	AAATATTTAA				1170

SEQ ID NO: 16: Nucleotide sequence of β 1,4 GalNAc transferase-encoding ORF 5a of *LOS* biosynthesis locus from *C. jejuni* strain OH4384

ATGCTATTTT	AATCATACTT	TGTGAAAATA	ATTTGCTTAT	TCATCCCTTT	50
TAGAAAAAAT	AGACATAAAA	TAAAAAAAAC	ATTTTTACTA	AAAAACATAC	100
AACGAGATAA	AATCGATTCT	TATTTACCAA	AAAAAACTCT	TGTGCAAATT	150
AATAAATACA	ACAATGAAGA	TTTAATTAAA	CTTAATAAAG	CTATTATAGG	200
GGAGGGGCAT	AAAGGATATT	TTAATTATGA	TGAAAAATCT	AAAGATCCAA	250
AATCTCCTTT	GAATCCTTGG	GCTTTTATAC	GAGTAAAAAA	TGAAGCTATT	300
ACCTTAAAAG	CTTCTCTTGA	AAGCATATTG	CCTGCTATCC	AAAGAGGTGT	350
TATAGGATAT	AATGATTGTA	CCGATGGAAG	TGAAGAAATA	ATTCTAGAAT	400
TTTGCAAACA	ATATCCTTCA	TTTATACCAA	TAAAATATCC	TTATGAAATT	450
CAAATTCAAA	ACCCAAAATC	AGAAGAAAAT	AAACTCTATA	GCTATTATAA	500
TTATGTTGCA	AGTTTTATAC	CAAAAGATGA	GTGGCTTATA	AAAATAGATG	550
TGGATCATAT	CTATGATGCT	AAAAAACTTT	ATAAAAGCTT	CTATATACCA	600
AAAAACAAAT	ATGATGTAGT	TAGTTATTCA	AGGGTTGATA	TTCATATTTT	650
TAATGATAAT	TTTTTCTTTT	GTAAAGATAA	TAATGGCAAT	ATATTGAAAG	700
AACCAGGAGA	TTGCTTGCTT	ATCAATAATT	ATAACTTAAA	ATGGAAAGAA	750
GTATTAATTG	ACAGAATCAA	TAACAATTGG	AAAAAAGCAA	CAAAACAAAG	800
TTTTTCTTCA	AATATACACT	CTTTAGAGCA	ATTAAAGTAT	AAACACAGGA	850
TATTATTTCA	CACTGAATTA	AATAATTATC	ATTTTCCTTT	TTTAAAAAAA	900
CATAGAGCTC	AAGATATTTA	TAAATATAAT	TGGATAAGTA	TTGAAGAATT	950
TAAAAAATTC	TATTTACAAA	ATATTAATCA	TAAAATAGAA	CCTTCTATGA	1000
TTTCAAAAGA	AACTCTAAAA	AAAATATTCT	TAACATTGTT	TTAA	1044

SEQ ID NO: 17: Amino acid sequence of β 1,4 GalNAc transferase from *C. jejuni* strain OH4384 (encoded by ORF 5a of *LOS* biosynthesis locus)

	10	20	30	40	50
1	MLFQSYFVKI	ICLFIPFRKI	RHKIKKTFL	KNIQRDKIDS	YLPKKTLLVQI
51	NKYNNEDLIK	LNKAIIGEGH	KGYFNYDEKS	KDPKSPLNPW	AFIRVKNEAI
101	TLKASLESIL	PAIQRGVIGY	NDCTDGSEEI	ILEFCKQYPS	FIPIKYPYEI
151	QIQNPKESEN	KLYSYNYVA	SFIPKDEWLI	KIDVDHIYDA	KKLYKSFYIP
201	KNKYDVVSYS	RVDIHYFNDN	FFLCKDNNGN	ILKEPGDLLL	INNYNLKWKE
251	VLIDRINNNW	KKATKQSFSS	NIHSLEQLKY	KHRILFHTEL	NNYHFPFLKK
301	HRAQDIYKYN	WISIEEFKKF	YLQNINHKIE	PSMISKETLK	KIFLTLF

SEQ. ID NO: 18. Nucleotide sequence of β -1,4-GalNAc transferase from *C. jejuni* 0:1.

ATGACTTTGT	TTTATAAAAT	TATAGCTTTT	TTAAGATTGC	TTAAAAATTGA	TAAAAAATTA
AAATTTGATA	ATGAATATTT	TTTAAACTTA	AATAAAAAAAA	TCTACAAATGA	AAAGCATAAA
GGTTTTTTTG	ATTTTGATCC	AAACTCAAAA	GATACAAAAT	CTCCTTTAAA	TCCATGGGCT
TTTATAAGAG	TAAAAAATGA	AGCCACTACT	TTAAGAGTAT	CACCTGAAAG	TATGTTACCT
GCCATACAAA	GAGGTGTTAT	AGGATATAAT	GATTGTACTG	ATGGAAGTGA	AGAAATTATT
TTGGAATTTT	GCAAACAATA	CCCTTCGTTT	ATACCAGTAA	AATATCCCCA	TGAGGTGCAA
ATTGAAAATC	CGCAAAGCGA	AGAAAATAAA	CTTCATAGTT	ATTATAACTA	TGTAGCTAGT
TTTATACCGC	AAGATGAGTG	GCTTATAAAA	ATAGATGTGG	ATCATTACTA	TGATGCAAAA
AAATTATATA	AGAGTTTTTA	TATGGCATCA	AAAAATACTG	CTGTTAGATT	TCCAAGAATT
AAATTTTTTA	TACTAGATAA	AATTGTAATT	CAAAATATAG	GAGAATGTGG	TTTTATCGAT
GGAGGGGATC	AATTGTTAAT	TCAAAAGTGC	AATAGTGTAT	TTATAGAAAAG	AATGGTTTCA
AAGCAAAGTC	AGTGGATTGA	TCCTGAAAAA	ACTGTGAAAG	AATTGTATTTC	TGAACAGCAA
ATTATACCCA	AACATATAAA	AATCTTACAA	GCAGAATTAC	TTCAATGGCA	TTTTCTGCT
TTAAAAATATC	ATAGAAATGA	TTATCAAAAA	CATTGGGATG	CTTTAACTTT	AGAAGATTTT
AAAAAAATCC	ATTATAGACA	TAGAAAAATA	AAGAAAATAA	ATTATACAAT	GCTTGATGAA
AAAGTAATTC	GTGAAATATT	AGATAAATTT	AAATTGAGTG	GTAATAAAAT	GACTTTAGCT
ATAATACCTG	CTCGAGCTGG	TTCAAAAGGT	ATAAAAAATA	AAAATTTAGC	TCTTTTGCAT
GATAGGCCTT	TGTTGTATTA	TACTATCAAT	GCAGCAAAAA	ATTCAAAGTA	TGTAGATAAA
ATTGTTTTTA	GTAGTGATGG	CGATGATATA	TTAGAATATG	GACAACTCA	AGGTGTAGAT
GTGTTAAAAA	GACCTAAAGA	ATTAGCGCTA	GATGATACAA	CTAGTGATAA	GGTTGTATTG
CATACCTTGA	GTTTTTATAA	AGATTATGAA	AATATTGTTT	TATTACAACC	CACCTTCTCT
TTAAGGACAA	ATGTACATAT	AGATGAAGCT	TTTTTAAAT	TTAAAAATGA	AAACTCAAAT
GCATTAATAA	TGTTGTAGA	ATGTGATAAT	AAAAATTTAA	AAGCTTTTAT	AGATGATAAT
GGTAACTTAA	AAGGAATTTG	TGATAACAAA	TATCCATTTA	TGCCTAGACA	AAAATTACCA
AAAACCTTATA	TGAGTAATGG	TGCAATTTAT	ATAGTAAAGT	CAAATTTATT	TTTAAATAAC
CCAACCTTTTC	TACAAGAAAA	AACAAGTTGC	TATATAATGG	ACGAAAAAGC	TAGTTTGGAT
ATAGATACAA	CAGAGGATTT	AAAAAGAGTT	AATAATATAA	GCTTCTTA	

SEQ. ID NO: 19. Amino Acid sequence of β -1,4-GalNAc transferase from *C. jejuni* 0:1.

MTLFYKIIAF	LRLKIDKKL	KFDNEYFLNL	NKKIYNEKHK	GFFDFDPNSK	DTKSPLNPW
AFIRVKNEAT	TLRVSLESML	PAIQRGVIGY	NDCTDGSEEI	ILEFCKQYPS	FIPVKYPHE
VQIENPQSEE	NKLHSYNYV	ASFIPQDEWL	IKIDVDHYD	AKKLYKSFYM	ASKNTAVRF
PRINFLILDK	IVIQNIGECG	FIDGGDQLLI	QKNSVFIER	MVSKQSQWID	PEKTVKELY
SEQQIIPKHI	KILQAEELLQW	HFPALKYHRN	DYQKHLDALE	LEDFKKIHYR	HRKIKKINY
TMLDEKVIRE	ILDKFKLSGK	KMTLAIIPAR	AGSKGIKNKN	LALLHDRPLL	YYTINAAKN
SKYVDKIVLS	SDGDDILEYG	QTQGVVVLKR	PKELALDDTT	SDKVVLHTLS	FYKDYENIV
LLQPTSPLRT	NVHIDEAFLK	FKNENSNALI	SVVECDNKIL	KAFIDDNGLN	KGICDNKYP
FMPRQKLPKT	YMSNGAIYIV	KSNLFLNNPT	FLQEKTSYCI	MDEKASLDID	TTEDLKRNNI SFL

SEQ. ID NO: 20. Nucleotide sequence of β -1,4-GalNAc transferase from *C. jejuni* 0:10.

ATGCTATTTT	AATCATACTT	TGTGAAAATA	ATTTGCTTAT	TCATCCCTTT	TAGAAAAATT
AGACATAAAA	TAAAAAAAAC	ATTTTACTA	AAAAACATAC	AACGAGATAA	AATCGATTCT
TATCTACCAA	AAAAAACTCT	TATACAAATT	AATAAATACA	ACAATGAAGA	TTTAATTAAA
CTTAATAAAG	CTATTATAGG	GGGGGGGCAT	AAAGGATATT	TTAATTATGA	TGAAAAATCT
AAAGATCCAA	AATCTCCTTT	GAATCCTTGG	GCTTTTATAC	GAGTAAAAAA	TGAAGCTATT
ACCTTAAAAG	CTTCTCTTGA	AAGCATATTG	CCTGCTATTG	AAAGAGGTGT	TATAGGATAT
AATGATTGCA	CCGATGGAAG	TGAAGAAAATA	ATTCTAGAAT	TTTGCAAACA	ATATCCTTCA
TTTATACCAA	TAAAATATCC	TTATGAAATT	CAAAATCAAA	ACCCAAAATC	AGAAGAAAAT
AAACTCTATA	GCTATTATAA	TTATGTTGCA	AGTTTATAC	CAAAAGATGA	GTGGCTCATA
AAAATAGATG	TGGATCATTA	TTATGATGCA	AAAAAATTAT	ATAAGAGTTT	TTATATACCT
AGAAAAAATT	ATCATGTAAT	TAGTTACTCT	AGGATAGATT	TTATATTTAA	TGAAGAAAAA
TTTTATGTTT	ATCGGAATAA	GGAGGGGGAG	ATTTTAAAAG	CTCCTGGAGA	TTGTTTAGCA
ATACAAAACA	CTAACTTATT	TTGGAAAAGAA	ATACTTATTG	AAGATGATAC	ATTTAAGTGG
AATACTGCAA	AAAATAATAT	AGAGAATGCA	AAATCATATG	AAATTTTAAA	AGTTAGAAAT
AGAATTTATT	TTACTACAGA	ACTTAATAAT	TATCATTTTC	CATTTATAAA	AAATTATAGA
AAAAATGATT	ATAAGCAGTT	AAATTGGGTT	AGCTTAGATG	ATTTTATTAA	AAATTATAAA
GAAAAATTAA	AAAATCAAAT	AGATTTTAAA	ATGCTAGAAT	ACAAAACATT	AAAAAAGTG
TACAAAAAGC	TTACATCTTC	AGCAAGCGAT	AAAATT		

SEQ. ID NO: 21. Amino acid sequence of β -1,4-GalNAc transferase from *C. jejuni* 0:1.

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MLFQSYFVKI ICLFIPFRKI RHKIKKTFLI KNIQRDKIDS YLPKKTLLIQI NKYNNEDLI
KLNKAIIGGG HKGYFNYDEK SKDPKSPLNP WAFIRVKNEA ITLKASLESI LPAIQRGVI
GYNDCTDGSE EIILEFCKQY PSFIPIKYPY EIQIQNPKE ENKLYSYNY VASFIPKDE
WLIKIDVDHY YDAKKLYKSF YIPRKNYHVI SYSRIDFIFN EEKFYVYRNK EGEILKAPG
DCLAIQNTNL FWKEILIEDD TPKWNTAKNN IENAKSYEIL KVRNRIYFTT ELNNYHFPF
IKNYRKNDYK QLNWVSLDDF IKNYKEKLKN QIDFKMLEYK TLKKVYKCLT SSASDKI
```

**SEQ. ID NO: 22. Nucleotide sequence of β -1,4-GalNAc transferase from *C. jejuni* 0:1.
O:36**

DNA :

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ATGCTTAAAA AAATCATTTT TTTATATAAA AGATACTCGA TTTCTAAAAA ATTGGTTTAA
GATAATGAGC ATTTTCATTAA GGAAAAATAA AACATCTATG GAAAAAACA TAAGGGCTTT
TTTGACTTTG ATGAAAAGGC TAAGGATGTG AAATCACCCC TTAATCCTTG GGGATTTATC
AGGGTTAAAA ATGAAGCTTT AACCCCTAAGA GTTTCCTTTAG AAAGTATACT ACCTGCTTTA
CAAAGAGGAA TTATAGCTTA CAACGACTGT GATGATGGGA GTGAAGAGCT TATTTTAGAA
TTTTGCAAGC AATATCCCAA CTTCAATTGCT AAAAAATATC CTTATAAAGT AGATCTAGAA
AATCCTAAAA ATGAAGAAAA TAAACTTTAC TCTTATTACA ATTGGGCAGC ATCTTTTATA
CCCTTAGATG AGTGGTTTAT AAAAATCGAT GTGGATCATT ACTACGATGC CAAGAAGCTT
TATAAGAGTT TTTATAGGAT TGATCAAGAA AATAAAGCCT TATGCTACCC AAGAATTAAT
TTTATAATCT TAAATGGAAA TATTTATGTG CAAAATAGTG GAAATTATGG ATTCATAGGG
GGGGGGGATC AACTCTTGAT TAAAAGAAGA AATAGTAGCT TTATAGAAAG AAGGGTTTCA A
AAAAAAGCCA ATGGATAGAT CCTAAGGGAC TTATAGAAGA ACTCTACTCC GAGCAACAAG
TCTTATCTCA AGGAGTGAAA ATACTACAAG CTCCCCTACT TCAGTGGCAT TTTCTGCCT
TAAATATCCG CCGAAACGAT TACCAACAAT ATTTAGATAT CTTGAGTTTA GAAGAATTTT
AGGCCTTTCA TCGTAAGAGC AAAGAGGCTA AAAAAATAGA CTTTGCCATG CTAAAACGCC
CTGTAATCGA GCAAATATTA AAGAAATTC AAGGAGAGAT AAAA
```

SEQ. ID NO: 23. Amino acid sequence of β -1,4-GalNAc transferase from *C. jejuni* 0:36.

```
MLKKIISLYK RYSISKKLVL DNEHFIKENK NIYGKKHKGF FDFDEKAKDV
KSPLNPWGFI RVKNEALTLR VSLESILPAL QRGIIAYNDC DDGSEELILE
FCKQYPNFIA KKYPYKVDLE NPKNEENKLY SYYNWAASFI PLDEWFIKID
VDHYYDAKKL YKSFYRIDQE NKALCYPRIN FIILNGNIYV QNSGNYGFIG
GGDQLLIKRR NSSFIERRVS KKSQWIDPKG LIEELYSEQQ VLSQGVKILQ
APLLQWHFPA LKYRRNDYQQ YLDILSLEEF QAFHRKSKEA KKIDFAMLR
PVIEQILKKF QGEIK
```

SEQ. ID NO: 24. Nucleotide sequence of β -1,4-GalNAc transferase from *C. jejuni* NCTC11168

```
ATGACTTTGT TTTATAAAAT TATAGCTTTT TTAAGATTGC TTAAATTGA TAAAAATTA--
AAATTTGATA ATGAATATTT TTAAACTTAA AATAAAAAAA TCTACGATGA AAAGCATAAA
GGTTTTTTTG ATTTTGATCC AAACCTCAAAA GATACAAAAT CTCCTTTAAA TCCATGGGCT
TTTATAAGAG TAAAAAATGA AGCCACTACT TTAAGAGTAT CACTTGAAAG TATGTTACCT
GCCATACAAA GAGGTGTTAT AGGATATAAT GATTGTACTG ATGGAAGTGA AGAAATTATT
TTGGAATTTT GCAAACAATA CCCTTCGTTT ATACCAGTAA AATATCCCCA TGAGGTGCAA
ATTGAAAATC CGCAAAGCGA AGAAAATAAA CTTCATAGTT ATTATAACTA TGATGCTAGT
TTTATACCGC AAGATGAGTG GCTTATAAAA ATAGATGTGG ATCATTACTA TGATGCAAAA
AAATTATATA AGAGTTTTTA TATGGCATCA AAAAATACTG CTGTTAGATT TCCAAGAATT
AATTTTTTAA TACTAGATAA AATTGTAATT CAAAATATAG GAGAATGTGG TTTTATCGAT
GGAGGGGATC AATTGTTAAT TCAAAGTGC AATAGTGTAT TTATAGAAAG AATGGTTTCA
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AAGCAAAGTC AGTGGATTGA TCCTGAAAAA ACTGTGAAAG AATTGTATTC TGAACAGCAA
ATTATACCCA AACATATAAA AATCTTACAA GCAGAATTAC TTCAATGGCA TTTTCCTGCT
TTAAAATATC ATAGAAATGA TTATCAAAAA CATTGGGATG CTTTAACTTT AGAAGATTTT
AAAAAATCC ATTATAGACA TAGAAAAATA AAGAAAATAA ATTATACAAT GCTTGATGAA
AAAGTAATTC GTGAAATATT AGATAAATTT AAATTGAGTG GTAAAAAAT GACTTTAGCT
ATAATACCTG CTCGAGCTGG TTCAAAAGGT ATAAAAAATA AAAATTTAGC TCTTTTGCAT
GATAGGCCTT TGTGTATTA TACTATCAAT GCAGCAAAAA ATTCAAAGTA TGTAGATAAA
ATTGTTTTAA GTAGTGATGG CGATGATATA TTAGAATATG GACAAACTCA AGGTGTAGAT
GTGTTAAAAA GACCTAAAGA ATTAGCGCTA GATGATACAA CTAGTGATAA GGTTGTATTG
CATACCTTGA GTTTTTATAA AGATTATGAA AATATTGTTT TATTACAACC CACTTCTCCT
TTAAGGACAA ATGTACATAT AGATGAAGCT TTTTAAAAAT TAAAAATGA AAACCTCAAT
GCATTAATAA GTGTTGTAGA ATGTGATAAT AAAATTTTAA AAGCTTTTAT AGGTGATAAT
GGTAACTTAA AAGGAATTTG TGATAACAAA TATCCATTTA TGCCTAGACA AAAATTACCA
AAACTTTATA TGAGTAATGG TGCAATTTAT ATAGTAAAGT CAAATTTATT TTTAAATAAC
CCAACCTTTC TACAAGAAAA AACAAGTTGC TATATAATGG ACGAAAAAGC TAGTTTGGAT
ATAGATACAA CAGAGGATTT AAAAAGAGTT AATAATATAA GCTTCTTA

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SEQ. ID NO: 25. Amino Acid sequence of β -1,4-GalNAc transferase from *C. jejuni* NCTC11168

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MTLFYKIIAF LRLKIDKKL KFDNEYFLNL NKKIYDEKHK GFFDFDPNSK DTKSPLNPW
AFIRVKNEAT TLRVSLESML PAIQRGVIGY NDCTDGSEEI ILEFCKQYPS FIPVKYPHE
VQIENPQSEE NKLHSYNYV ASFIPQDEWL IKIDVDHYD AKKLYKSFYM ASKNTAVRF
PRINFLILDK IVIQNIGECG FIDGGDQLLI QKCNVFIER MVSKQSQWID PEKTVKELY
SEQQIIPKHI KILQAELOW HFPALKYHRN DYQKHLALT LEDFKKIHyr HRKIKKINY
TMLDEKVIRE ILDKFKLSGK KMTLAIIPAR AGSKGIKNKN LALLHDRPLL YYTINAAKN
SKYVDKIVLS SDGDDILEYG QTQGVVDLKR PKELALDDTT SDKVVLHTLS FYKDYENIV
LLQPTSPLRT NVHIDEAFLK FKNENSNALI SVVECDNKIL KAFIDDNGNL KGICDNKYP
FMPRQKLPKT YMSGAIYIV KSNLFLNNPT FLQEKTSYI MDEKASLDID TTEDLKRNN ISFL

```

SEQ ID NO: 26: Nucleotide sequence of β 1,3-galactosyltransferase-encoding ORF 6a of *LOS* biosynthesis locus from *C. jejuni* strain OH4384

```

ATGTTTAAAA TTTCAATCAT CTTACCAACT TATAATGTGG AACAAATATAT 50
AGCAAGGGCA ATAGAAAGCT GTATCAATCA GACTTTTAAA GATATAGAAA 100
TAATTGTAGT TGATGATTGT GGAAATGATA ATAGTATAAA TATAGCCAAA 150
GAATACTCTA AAAAAGACAA AAGAATAAAA ATAATCCACA ATGAAAAAAA 200
CTTAGGTCTT TTAAGAGCAA GATATGAAGG TGTGAAAGTA GCAAACCTCTC 250
CTTATATAAT GTTTTTAGAT CCTGATGATT ATTTGGAAC TAAATGCTTGT 300
GAAGAGTGTA TAAAAATTTT AGATGAACAG GATGAAGTTG ATTTAGTGTT 350
TTTCAATGCT ATTGTTGAAA GTAATGTTAT TTCATATAAA AAGTTTGACT 400
TTAATTCTGG TTTTATAGC AAAAAAGAGT TTGTAAAAAA AATTATTGCA 450
AAGAAAAATT TATATTGGAC TATGTGGGGG AACTTTATAA GAAAGAAATT 500
GTATTTAGAA GCTTTTGCAG GTTTAAGACT CGAGAAAGAT GTTAAATCA 550
ATATGGCTGA AGATGTATTG TTATATTATC CAATGTTAAG TCAAGCTCAA 600
AAAATAGCAT ATATGAAGT TAATTTATAT CATTACGTGC CTAATAATAA 650
TTCAATTTGT AATACTAAGA ATGAAGTGCT TGTTAAAAAT AATATTCAAG 700
AGTTGCAGTT GGTTTTAAAC TATTTAAGGC AAAATTATAT TTAAACAAG 750
TATTGTAGCG TTCTCTATGT GCTAATTAAA TATTGCTAT ATATTCAAAT 800
ATATAAAATA AAAAGAACAA AATTAATGGT TACATTATTA GCTAAAATAA 850
ATATTTTAAAC TTTAAAAATT TTATTTAAAT ATAAAAAATT TTTAAACAA 900
TGTTAA 906

```

SEQ ID NO: 27 Amino acid sequence of β 1,3-galactosyltransferase encoded by ORF 6a of *LOS* biosynthesis locus from *C. jejuni* strain OH4384

	10	20	30	40	50
1	MFKISIIILPT	YNVEQYIARA	IESCINQTFK	DIEIIVVDDC	GNDNSINIAK
51	EYSKKDKRIK	IIHNEKNLGL	LRARYEGVKV	ANSPYIMFLD	PDDYLELNAC
101	EECIKILDEQ	DEVDLVFFNA	IVESNVISYK	KDFNSGFYS	KKEFVKKIIA
151	KKNLYWTMWG	KLIRKKLYLE	AFASLRLEKD	VKINMAEDVL	LYYPMLSQAQ
201	KIAYMNCNLY	HYVPNNNSIC	NTKNEVLVKN	NIQELQLVLN	YLRQNYILNK
251	YCSVLYVLIK	YLLYIQIYKI	KRTKLMVTLL	AKINILTLKI	LFKYKKFLKQ
301	C				

SEQ ID NO: 28. Nucleotide sequence of CgtB β 1,3 galactosyltransferase from *C. jejuni* serotype O:2 (strain NCTC 11168).

ATGAGTCAAA	TTTCCATCAT	ACTACCAACT	TATAATGTGG	AAAAATATAT	50
TGCTAGAGCA	TTAGAAAGTT	GCATTAACCA	AACTTTTAAA	GATATAGAAA	100
TCATTGTAGT	AGATGATTGT	GGTAATGATA	AAAGTATAGA	TATAGCTAAA	150
GAGTATGCTA	GTAAAGATGA	TAGAATAAAA	ATCATACATA	ATGAAGAGAA	200
TTTAAAGCTT	TTAAGAGCAA	GATATGAAGG	TGCTAAAGTA	GCAACTTCAC	250
CTTATATCAT	GTTTTTAGAT	TCTGATGATT	ATTTAGAACT	TAATGCTTGC	300
GAAGAATGTA	TTAAAATTTT	GGATATGGGT	GGGGGGGGTA	AAATTGATTT	350
GTTGTGTTTT	GAAGCTTTTA	TTACCAATGC	AAAAAAATCA	ATAAAAAAAT	400
TAAATATAAA	ACAAGGAAAA	TACAACAACA	AAGAATTTAC	AATGCAAATA	450
CTTAAACTA	AAAATCCATT	TTGGACAATG	TGGGCTAAAA	TAATCAAAAA	500
AGATATTTAT	TTAAAAGCCT	TCAACATGTT	AAATCTCAAA	AAAGAAATCA	550
AAATAAATAT	GGCAGAAGAT	GCCTTATTAT	ATTATCCTTT	GACAATATTA	600
TCTAATGAAA	TATTTTACTT	AACACAACCT	TTGTATACCC	AGCATGTAAA	650
TAGCAATTCT	ATAACAAATA	ATATTAATTC	TTTAGAAGCT	AATATTCAAG	700
AACATAAAAT	TGTTTTAAAT	GTTTTAAAT	CAATTAAAAA	TAAAAAAACA	750
CCTCTATATT	TTCTAATTAT	ATATTTATTA	AAAATTCAAT	TATTGAAATA	800
TGAACAAAAT	TTTAATAAAA	GAAATATAAA	TCTTATTTAT	TATAAAATAA	850
ATATTTTATA	TCAAAAATAT	CAATTCAAAT	GGAAAAAATT	TTTATATAAT	900
TTAATTCCGT	AA				912

SEQ ID NO: 29. Amino acid sequence of CgtB β 1,3 galactosyltransferase from *C. jejuni* serotype O:2 (strain NCTC 11168).

	10	20	30	40	50
1	MSQISIIILPT	YNVEKYIARA	LESCINQTFK	DIEIIVVDDC	GNDKSIDIAC
51	EYASKDDRIK	IIHNEENLKL	LRARYEGAKV	ATSPYIMFLD	SDDYLELNAC
101	EECIKILDMG	GGGKIDLLCF	EAFITNAKKS	IKKLNIKQ GK	YNNKEFTMQL
151	KTKNPFWTMW	AKIIKKDIYL	KAFNMLNLKK	EIKINMAEDA	LLYYPLTILS
201	NEIFYLTQPL	YTQHVNSNSI	TNNINSLEAN	IQEHKIVLNV	LKSIKNKKTP
251	LYFLIIYLLK	IQLLKYEQNF	NKRININLIYY	KINILYQKYQ	FKWKKFLYNL
301	IP				

SEQ ID NO. 30: Nucleotide sequence of β -1,3-galactosyl transferase from *C. jejuni* O:10

```

ATGTTTAAAA TTTCAATCAT CTTGCCAACT TATAATGTGG AACAAATATAT AGCAAGGGCA
ATAGAAAGTT GTATCAATCA GACTTTTAAA AATATAGAAA TAATTGTAGT TGATGATTGT
GGAAGTGACA AAAGTATAGA TATAGTTAAA GAATATGCCA AAAAAGATGA TAGAATAAAA
ATCATAACATA ATGAAGAAAA TTTAAACTT TTAAGAGCTA GATATGAAGG TGTAAGAGTA
GCAAACTCTC CTTATATAAT GTTTTATAGAT CCTGATGATT ATTTAGAACT TAATGCTTGT
GAAGAATGTA TGAAAATTTT AAAAAACAAT GAAATAGATT TATTATTTT TAATGCATTT
GTATTGGAAA ATAACAATAA AATAGAAAGA AAGTTGAATT TTCAAGAAAA ATGTTATGTA
AAAAAAGATT TTTTAAAGA ACTATTAATA ACTAAAAATT TATTTTGGAC AGTGTGGGCA
AAAGTCATAA AAAAGAATT ATATCTCAAG GCTGTTGGTT TAATATCGCT AGAAAATGCT
AAAATAAATA TGGCTGAAGA TGTTTTATTA TATTACCCTT TGATAAATAT TTCAAATACT
ATATTTCACT TGAGTAAAAA TTTATACAAT TATCAAATAA ATAATTTCTC TATAACCAAA
ACATTAACAT TGCAAAATAT AAAAAACAAAT ATACAAGAAC AAGATAATGT TCTATATCTT
CTAAGAAGA TGCAATATAA TTACAATTTT AACTTAACTT TGCTTAAATT AATTGAGTAT
TTTTTATTAA TTGAAAAATA CTCATTATCA AGCAAGCGAA ATGTTCTTTG TTTTAAATC
AATATTTTTT TTAAAAAAAT CCAATTTAAA TTTTATCGCT TGCTGAAGAT G

```

SEQ ID NO. 31: Amino acid sequence of β -1,3-galactosyl transferase from *C. jejuni* O:10

```

MFKISII LPT YNVEQYIARA IESCINQTFK NIEIIVDDC GSDKSIDIVK EYAKKDDRI
KIIHNEENLK LLRARYEGVK VANSPIYIMFL DPDDYLELNA CEECMKILKN NEIDLLFFN
AFVLENNNKI ERKLNFOEKC YVKKDFLKE LKTKNLFWTV WAKVIKKELY LKAVGLISL
ENAKINMAED VLLYYPLINI SNTIFHLSKN LYNQINNFS ITKTLTLQNI KTNIQEQDN
VLYLLKKMQY NYNFNLTLLK LIEYFLLEIK YSLSSKRNV L CFKINIFFKK IQKFYRLLK M

```

SEQ ID NO: 32. Amino acid sequence of lipid A biosynthesis acyltransferase (*C. jejuni* OH4384).

```

1 MKNSDRIYLS LYIILKFFVT FMPDCILHFL ALIVARIAFH LNKKHRKIIN
51 TNLQICFPQY TQKERDKLSL KIYENFAQFG IDCLQNQNTT KEKILNKVNF
101 INENFLIDAL ALKRPIIFTT AHYGNWEILS LAYAAKYGAI SIVGKKLKSE
151 VMYEILSQSR TQFDIELIDK KGGIRQMLSA LKKERALGIL TDQDCVENES
201 VRLKFFNKEV NYQM GASLIA QRSNALIIPV YAYKEGGKFC IEFKAKDSQ
251 NASLEELTLY QAQSCEEMIK KRPWEYFFFH RRFASYNEEI YKGAK

```

SEQ ID NO: 33. Amino acid sequence of glycosyltransferase encoded by ORF 3a of *C. jejuni* OH4384 *LOS* locus.

```

1 MNLKQISVII IVKNAEQTLL ECLNSLKDFD EIILLNNESS DNTLKIANEF
51 KKDFANLYIY HNAFIGFGAL KNLALS YAKN DWILSIDADE VLENECIKEL
101 KNLKLQEDNI IALSRKNLYK GEWIKACGWW PDYVLRIFNK NFTRFNDNLV
151 HESLVLP SNA KKIYLNGLK HYSYKDISHL IDKMQYYSSL WAKQNIHKKS
201 GVLKANLRAF WTFFRNYFLK NGFLYGYKGF IISVCSALGT FFKYMKLYEL
251 QRQKPKTCAL IIITYNQKER LKLVLD SVKN LAFLPNEVLI ADDGSKEBTA
301 RLIEEYQKDF PCPLKHIWQE DEGFKLSKSR NKTIKNADSE YIIVIDGDMI
351 LEKDFIKEHL EFAQRKLFLQ GSRVILNKKE SEEILNKDDY RIIFNKKDFK
401 SSKNSFLAKI FYSLSKKR

```

SEQ ID NO: 34. Amino acid sequence of glycosyltransferase encoded by ORF 4a of *C. jejuni* OH4384 *LOS* locus.

```

1 MKKIGVVIPI YNVEKYLREC LDSVINQTYT NLEIILVNDG STDEHSLNIA
51 KEYTLKDKRI TLFDKKNGGL SSARNIGIEY FSGEYKLKNK TQHIKENS LI
101 EFQLDGNNPY NIYKAYKSSQ AFNNEKDLTN FTYP SIDYII FLDS DNYWKL
151 NCIEECVIRM KNVDVLWFDH DCTYEDNIKN KHKKTRMEIF DFKKECIITP
201 KEYANRALSV GSRDISFGWN GMIDFNFLKQ IKLKFINFII NEDIHFGIIL
251 FASANKIYVL SQKLYLCRLR ANSISNHDKK ITKANVSEYF KDIYETFGEN
301 AKEAKNYLKA ASRVITALKL IEFKDKQNE NALAIKETFL PCYAKKALMI
351 KKFKKDPLNL KEQLVLIKPF IQTKLPYDIW KFWQKIKNI

```

SEQ ID NO: 35. Amino acid sequence of sialic acid synthase encoded by ORF 8a of *C. jejuni* OH4384 *LOS* locus.

```

1 MKEIKIQNII ISEEKAPLVV PEIGINHNG SLELAKIMVD AAFSTGAKII
51 KHQTHIVEDE MSKAAKKVIP GNAKISIIYEI MQKCALDYKD ELALKEYTEK
101 LGLVYLSTPF SRAGANRLED MGVSFAFKIGS GECNNYPLIK HIAAFKKPMI
151 VSTGMNSIES IKPTVKILLD NEIPFVLMHT TNLYPTPHNL VRLNAMLELK
201 KEFSCMVGLS DHTTDNLACL GAVALGACVL ERHFTDSMHR SGPDIVCSMD
251 TQALKELIIQ SEQMAIMRGN NESKKAQOE QVTIDFAFAS VVSIKDIKKG
301 EVLSMDNIWV KRPGLGGISA AEFENILGKK ALRDIENDTQ LSYEDFA

```

SEQ ID NO: 36. Amino acid sequence of enzyme involved in sialic acid biosynthesis encoded by ORF 9a of *C. jejuni* OH4384 *LOS* locus.

```

1 MYRVQNSSEF ELYIFATGMH LSKNFGYTVK ELYKNGFKNI YEFINYDKYF
51 STDKALATTI DGFSRYVNEL KPDLIIVVHGD RIEPLAAAIIV GALNNILVAH
101 IEGGEISGTI DDSLRHAISK LAHIHLVNDE FAKRRMLQLG EDEKSIFIIG
151 SPDLELLNDN KISLNEAKKY YDINYENYAL LMFHPVTTEI TSIKNQADNL
201 VKALIQSNKN YIVIYPNNDL GFELILQSYE ELKNNPRFKL FPSLRFEYFI
251 TLLKNADFII GNSSCILKEA LYLKTAGILV GSRQNGRLGN ENTLKVNANS
301 DEILKAIN TI HKKQDLFSAK LEILDSSKLF FEYLQSGEFF KLNTQKVFKD
351 IK

```

SEQ ID NO: 37. Amino acid sequence of CMP-sialic acid synthetase encoded by ORF 10a of *C. jejuni* OH4384 *LOS* locus.

```

1 MSLAIIPARG GSKGIKKNL VLLNNKPLIY YTIKAALNTK SISKVVVSSD
51 SDEILNYAKS QNVDILKRPI SLAQDNTTSD KVLLHALKFY KDYEDVVFLQ
101 PTSPLRTNIH IDEAFNLYKN SNANALISVS ECDNKILKAF VCNEYGDLAG
151 ICNDEYPFMP RQKLPKTYMS NGAIYILKIK EFLNNPSFLQ SKTKHFLMDE
201 SSSLDIDCLE DLKKAEQIWK K

```

SEQ ID NO: 38. Amino acid sequence of acetyltransferase encoded by ORF 11a of *C. jejuni* OH4384 *LOS* locus.

```

1 MEKITLKC NK NILNLLKQYN IYTKTYIENP RFRSRLKTKD FITFPLENNQ
51 LESVAGLGIE EYCAFKFSNI LHEMDSFSFS GSFLPHYTKV GRYCSISDGV

```

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101 SMFNFQHPMD RISTASFTYE TNHSFINDAC QNHINKTFPI VNHNPSSSIT
151 HLI IQDDVWI GKDVLLKQGI TLGTGCVIGQ RAVVT KDVPV YAI VAGIPAK
201 I IKYRFDEKT IERLLKIQWW KYHFADFYDI DLNLKINQYL DLLEEKIIKK
251 SISYYNPNKL YFRDILELKS KKIFNLF

```

SEQ ID NO: 39. Amino acid sequence of glycosyltransferase encoded by ORF 12a of *C. jejuni* OH4384 *LOS* locus.

```

  1 MPQLSII IPL FNSCDFISRA LQSCINQTLK DIEILIIDDK SKDNSLNMVL
 51 EFAKKDPRIK IFQNEENLGT FASRN LGVLH SSSDFIMFLD SDDFLTPDAC
101 EIAFKEMKKG FDL LCFDAFV HRVTKQFYR FKQDEVFNQK EFLEFLSKQR
151 HFCWSVWAKC FKKDIILKSF EKIKIDERLN YGEDVLFCYI YFMFCEKIAV
201 FKTCIYHYEF NPNGRYENKN KEILNQNYHD KKKSNEIIKK LSKEFAHDEF
251 HQKLFEVLKR EEAGVKNRLK

```